

LEAF – Linking Environment and Farming



Additional Guidance Notes for LEAF Marque Global Standard Version 9

This guidance does not include information on all control points since there is relevant material within the standard. It aims to help farmers and growers to implement Integrated Farm management (IFM) and be compliant to LEAF Marque standards. Please refer to the LEAF Audit 2010 for further guidance and useful information and templates where appropriate. A Glossary is attached at the end of this document.

1.0 Organisation and Planning

Principle Summary (not binding for audit purposes):

Good organisation and planning are the keys to a successful IFM approach. Setting objectives and monitoring the results provide the means by which the benefits of IFM can be quantified and demonstrated. As a starting point it is important to identify the short and long term objectives of the farm business by reflecting on: 'Why do I farm and where do I want my business to go?' These can cover areas such as: finance and profitability, family considerations, staff motivation, crop performance, livestock performance and welfare, market outlets, environmental commitment, communication with the local community, etc. LEAF has always strongly promoted the rationale of 'Do the right thing, the right way, for the right reasons,' and sought to be innovative and prepared for issues which can affect the industry in the future. It is very important to promote and inform interested parties of activities on the farm, and encourage feedback on how your business is perceived and what LEAF, LEAF Marque and integrated farming means for consumers. This can be beneficial to the business, the industry and provide excellent public relations.

- 1.1 As outlined.
- 1.2 The LEAF Audit is an on-line self-assessment management tool to help you adopt integrated farm management (IFM). The audit enables the completion of an action plan based on IFM and the environment; it allows you to benchmark your farm against others and against your last years score. To complete the audit firstly join LEAF, whereupon you will be issued with a Username and Password. Enter the Username and Password at www.leafaudit.org and you will be ready to start with the LEAF Audit. Think of the LEAF Audit as a tool that you use to target continual environmental improvement of your farm.
- 1.3 The most widely recognized assurance scheme for Good Agricultural Practice is GLOBALGAP (Formally EUREPGAP). Farms that are aiming for LEAF Marque should already have achieved a certificate for GLOBALGAP or a benchmarked scheme approved by GLOBALGAP for each enterprise on the farm. Any equivalent scheme must involve independent certification from an approved Certification Body. Equivalent scheme in Spain will be Integrated Production. This is now 'Nationally Recognised' for various crops and also 'Region' recognition for a wide variety of crops. At present there is no

Accredited Certification Body authorised for this scheme but is considered as a Good Agricultural Practice Standard.

An up to date list can be found here: http://www.globalgap.org/cms/front_content.php?idcat=29

Applicant standards are also available on the website. It will be the responsibility of the LEAF Marque Technical Advisory Committee to approve local schemes.

- 1.4 Your Environmental Policy is your statement to your commitment to optimize your usage of power, water and other consumables. It is your commitment to reducing the waste that is produced on the farm and increasing the recycling of those materials that can be re-used. It is also your commitment to reducing pollution (including 'greenhouse gas' emissions) wherever possible on the farm, greenhouse or production area. The policy that you have must be at the core of your business and everyone involved with your business must work and operate in accordance with the policy. IFM principles will help a reduction of 'greenhouse gases' (GHG) through good resource management. <http://www.icbe.com/emissions/calculate.asp> gives a list of IPCC main GHG's. A good starting point is with regional or national legislation. If there is legislation in place, make sure that you understand it and apply it to the everyday activities of your business. You should then construct your policy to target the optimization of power and water, the reduction of waste through recycling and the minimization of air, water and land pollution through the control of waste. It can look, at first sight, an almost impossible task. But if you break down your policy into these sections, the construction and implementation of your policy is very achievable. The policy must be communicated to all staff and permanent staff (see 1.8) must have signed off a record to show they have read and understood this aim of the business.

Example content of an Environmental Policy

To continue to adopt the principles of Integrated Farm Management (IFM) to increase biodiversity levels, and mitigate the effects of agricultural production on the environment

To use the LEAF audit, alongside energy, carbon and water auditing tools, as a method of reviewing and assessing the farms environmental performance

To continue to use precision farming techniques to maximise fertiliser efficiency, ensuring that only as much as necessary and as little as possible is applied

To explore the use of biological pest control techniques where their use could be used to reduce the use of artificial pesticides on the farm

To maintain and improve soil structure by using min-till cultivation techniques and maintaining organic matter levels by the incorporation of crop residues (where appropriate)

To continue to communicate to all farm staff what key species and habitats exist on the holding and what they can do to maintain and enhance them (eg. avoiding driving on field margins to prevent disturbance to nesting bird species)

To meet all regulatory and legislative requirements including those that pertain to the protection and enhancement of water, soil and air

To reduce the total amount of waste produced on the farm and ensure that every recycling opportunity is fully exploited

- 1.5 From this policy, you can construct your forward plan.

1.6/1.7 As outlined.

- 1.8 All permanent staff, whether part or full time must be aware of and understand the policy.

- 1.9 You can use email as a means of communication and also display your Environmental Policy on your website using links.

1.10 As outlined.

- 1.12 Updated to CFP (2010) this standard is all about reducing waste in the supply chain within the grower's control.

1.13-1.15 As outlined.

- 1.16 Training on IFM practices and principles will help your team to appreciate your care and concern for the whole farm environment, It will also give them a better understanding and commitment to sustainable production.
- 1.17 The main processes contributing to carbon release (expressed as carbon equivalents) are livestock, fertilisers and manure use, and fuel. Trees remove carbon dioxide from the atmosphere and transfer this carbon to the soil resulting in a slow build-up of carbon in the soil. This then counterbalances carbon release from other processes. The key thing is to be consistent from year to year to ensure that you compare like with like, and to make sure you have access to the relevant information for the areas you want to cover, e.g. electricity bills.

http://www.farmingfutures.org.uk/sites/default/files/casestudy/pdf/FF_FS25_Farm%20carbon%20accounting.pdf

This fact-sheet gives examples of online general carbon accounting tools and life cycle greenhouse gas analysis of goods and services.

Data gathering: The basic information required will be along the following lines, the tool used will give further detail on how to input the figures:

Electricity: kWh of electricity used – from bills for the relevant time period. Make sure that the total is just for farm enterprises; you may want to look at housing or any let buildings separately. If possible use actual meter readings, rather than estimates;

Fuel: Litres of fuel used – to include diesel, petrol and LPG. You may wish to focus just on fuel used for farm operations, and leave out fuel used for other purposes If you use contractors for any of your field operations, account for or estimate of the number of hours they worked and the sizes of tractors used (horsepower, or an estimate of this);

Livestock: Average number of head on farm over the year _ Average number of grazing days per head (for lambs the % time at grass) % of manure (while housed) that is stored as slurry, spread daily or stored as FYM;

Crops: Tonnes of crop harvested, Tonnes of straw moved off farm or estate to another business Hectares of grass & soft/top fruit crops;

Nutrients: Tonnes or cubic metres of nutrients applied to land and % N, Tonnes of lime applied Tonnes or cubic metres of animal manures or slurry that is brought onto or leaves the farm and % N;

Land use change: Hectares of land where use has changed, e.g. from grass to arable or woodland to arable or vice versa – this will estimate carbon sequestration as well as emissions;

Woodland: Total hectares of woodland on the farm, broken down between broadleaved and conifer, leaving out hedgerows and orchards.

Input these figures into a calculator.

Results: You can use the output from the calculator to compare with other farms, explore how different management practices can reduce greenhouse gas emissions, and see where there may be energy or input saving measures.

See also <http://www.sac.ac.uk/mainrep/pdfs/carbonfootprint.pdf>

2.0 Soil Management & Fertility

Principle Summary (not binding for audit purposes):

Soil is the basis of all agricultural production and the conservation and improvement of this valuable resource must be of the highest priority in the adoption of IFM. This allows produce to be grown on healthy and biologically active soil with a satisfactory level of organic matter, a good physical structure and sufficient fertility.

- 2.1 The advice that you take on crop nutrition, is key advice in the successful production of your crops. A LEAF farmer must take advice from someone who is qualified to give that advice. Specific professional development schemes are open to nutritional advice specialists in various countries and, if this is the case, A LEAF farmer should take advice from someone who is qualified in such a scheme. In the absence of a professional scheme, the equivalent qualification may be gained at degree level that is majors in agronomy. See 3.14

A LEAF farmer should request and keep on file the up to date and relevant certificate that demonstrates the competence of the individual who delivers nutritional advice.

- 2.2 A nutrient management plan looks at the equilibrium between the requirements of your crop, the nutrient index of the land, the nutrient content of the plant debris from the previous crop and the type of nutrition being added to grow the crop. So, a LEAF Farmer will need to know soil nutrition indices, through regular soil analysis. The nutritional requirements of various crops are documented and available for reference. Such a reference document would be Fertiliser Recommendations (RB209 version 8) in the UK. Similar documents are produced in other countries. There are also similar guidelines for Phosphate and Potash residues from previous crop trash incorporated into the land. Manures and other organic fertilizers can be analysed for nutritional content. Remember to show emphasis on efficiency and reducing use.
- With all of this information, a farmer can manage the application of applied nutrition to achieve equilibrium. Enough for growing the crop, not too much so that there is leaching or unnecessary accumulation and an optimization of expenditure correlated to yield output.
- Expect to see a nutrient balance for the crop. Starting with the crop extraction quantities and then inputs from: soil, water, organic material and base dressings. This should then be planned for the crop duration and adjusted through observations or foliar analysis.
- Where applicable, consideration of Nitrate vulnerable zones and legal NO₃ for lettuce and spinach must be given.
- 2.3 Soil Mapping should be broken down into the constituent parts of your farm. It is about risk assessing the farm as a whole and using this to manage the problems such as erosion, run-off, soil structure damage in the wet, nutrient leaching and water course contamination prevention. The easiest way is through the physical drawing of a colour coded map, outlining the different soil structures and gradients of the farm. This soil mapping is then implanted into your whole farm conservation and production manual. It outlines which activities must and must not be carried out in each of the areas of the farm so that the problems that can be faced, are minimised as much as possible.
- Each farm can have a soil map. Some farms will have a whole range of different soils and gradients, some farms will be simply one similar type.
- 2.4 LEAF encourages the use of Green Manures and Composts. Where appropriate, management of formal composting of plant wastes and manures is actively encouraged. Vermiculture and Vermicomposting is a simple and straightforward way to compost these materials on a small scale basis.
- http://www.organiccentre.ca/DOCs/Vermiculture_FarmersManual_gm.pdf
- Growing of green manures as break crops and returning the plant material back into the land before the commercial crop is sown, is an excellent way of stopping erosion, stopping leaching and putting organic matter back into the land. In situations where climatic conditions are adverse, hot and low rainfall – Mediterranean and North Africa countries, increasing soil fertility through green manures or similar techniques, may not be viable- water may be scarce, conservation of the little that is there would be the objective. Wind erosion is a potential problem in dry areas. Please note that organic soil improvement can reduce ‘greenhouse gases’ by locking up carbon in the soil.
- 2.5/2.6 As outlined.
- 2.7 For annual cropping situations, a 3 year cropping rotation plan is a must for a LEAF grower. The rotation strategy should concentrate on the rotation of different crop types, so as to ensure minimum build up of potentially threatening pest and disease levels in the soils and surrounding environment. If mono-cropping is the only option, consider the use of short-term break crops for either cutting and composting or cutting and incorporating.
- 2.8 – 2.10 As outlined.
- 2.11 Training of people working on nutrition application on the farm is essential. Training should be commensurate with the type of application that is being undertaken. Key training points will include accurate calculations of the amount of nutrition to apply per unit area, placement of nutrition in

relation to the crop, control of placement in order to protect the environment. Training is an objective activity. There must be a clearly set out training document with clear records of trainees and successfully completed training sessions.

This should be for all staff, even if they are just following instructions-such as “two bags of A, and 1 bag of B every 5 days in the fertigation tank”. This is often thought not to be necessary.

2.13 Effective nutrient management for crops and livestock is an essential activity on all farms.

Sample questions:

- Q. What is your annual usage of (bagged) Nitrogen (N) fertiliser?
- _____ kg N per Tonne crop
- _____ kg N per 1000 litres milk
- _____ kg N per animal
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- Q. What is your annual usage of N applied in Farm Yard Manure (FYM) that is imported onto the farm and available to the crop?
- _____ kg N per Tonne crop
- _____ kg N per 1000 litres milk
- _____ kg N per animal
-
- Q. What is your annual usage of N fixed by legumes?
- _____ kg N per Tonne crop
- _____ kg N per 1000 litres milk
- _____ kg N per animal

3.0 Crop Health and Protection

Principle Summary (not binding for audit purposes):

IFM uses and encourages continual improvement in pest control measures that have minimal impact on the environment and human health and which promote sustainability and profitability. A well established and managed crop will be more competitive with weeds, more resilient to attack from pests and diseases and should require fewer pesticide inputs.

3.1 Crop Protection for a LEAF farmer is an integrated system.

all have an influence on crop protection and, when used together, can significantly strengthen a Crop Protection Programme over and above simply using a pesticide.

- Resistant Varieties
- Companion Plants
- Antagonistic/Parasitic Fungus Species
- Rotation
- Soil Structure
- Nutritional Input
- Growing within the ‘Right Season’
- Use of predators
- Use of traps
- Crop Nets
- Correct Irrigation Practices
- Dust Management
- Pesticide Choice
- Application Timing
- Customer Specification
- Use of HOT (mustard) crops for soil BIO disinfection
- Scouting
- Use of weather predictions Temp x °H .

Your Crop Protection Policy should be drawn up with all of these factors being considered.

- 3.2 A sophisticated Crop Protection Policy will have, at the core of its considerations, a pest resistance avoidance strategy. Farmers should make a plan to rotate applications of active ingredients (where the legislation and customer preference allows), and employ non-chemical techniques wherever practically and economically feasible. Making use of insect barriers is a key point, as well as the introduction of predators. An integrated pest, weed and disease control system, is essential practice in the fight against resistant species. Always think of what can be done to control the problem BEFORE using a pesticide.
- 3.3 Scouting is the method that is used to determine the range and quantities of Pests present in a crop. People on-farm should be trained to identify pests. There should be a structured monitoring procedure in the crop, with a structured and quantifiable recording procedure of problems seen, with a threshold based decision system. Certain pests and disease levels can also be linked into climatic factors such as temperature, free water on the surface of the leaves, humidity and times of the year. The agronomist may be the only person responsible for crop scouting in some situations – farm workers may be only seasonal and training may not be a valid option.
- All of this together, leads to an accountable system of pest, disease and weed identification, target and control.
- 3.4 The use of these counts, conditions and thresholds, provides justification to apply, or not to apply a crop protection product. A properly completed scouting sheet, with the problems found expressed as a percentage of what was inspected, cross-correlated against a pre-determined threshold, is the basis of the written record and justification for a crop protection application. “Official” (Regional Agricultural Office) thresholds may be available and used as a base for P +D controls and modified to local farming conditions. In some cases sampling procedures may be available – number of leaves per plant or plants sampled per m², number of fruits per tree etc.
- 3.5 Training the staff who are employed to monitor pests, disease and weeds, is of key importance. Training should be relevant to the crop rotation of the farm and should concentrate on the usual pests, diseases and weeds found in and on those crops. Training should be conducted by an individual who is a professional agronomist and who has a good working knowledge of pest, disease and weed control. Those being trained should be trained according to a schedule and training should be recorded. A basic exam at the end of training, to demonstrate a level of competence, is encouraged. Use photographs and pictures as much as possible during training, as a useful recognition tool. The agronomist may be the only person responsible for crop scouting in some situations – farm workers may be only seasonal and training may not be a valid option.
- 3.6 Look at the consequences of what you are aiming to do in terms of crop protection and Pest, Disease & Weed control. If you spray a chemical, as well as treating the problem, what will be the consequences on:
- Bees?
 - Invertebrate Predators?
 - Companion Plants?
 - Field Boundaries?
 - Potential Water Contamination?
 - People Safety?
 - Medium/ Long-Term soil contamination?
 - Vertebrates in the crop?
 - The adjacent crop or dwellings?
 - Beneficial insects – side effects?
- A risk assessment may be a valid option for valuating options for chemical applications based on above list.
- If you use physical means to control a problem in a crop, such as weeds, what will the consequences be to:
- Nesting birds and eggs?
 - Bumble Bees?

- Burrowing animals living within the crop root zone, or vertebrates living in the crop canopy?
- The root system of the crop?
- Ground compaction (more passes up and down the field than with a wide boom sprayer)?

There are consequences to every situation, some of them very negative to the environment of the farm. LEAF asks us to think about these consequences and mitigate environmental damage through pre-thinking our activities and choosing the most appropriate solution for successful crop growth and good environmental management.

- 3.7 If you are going to reduce the rate of the chemical to be applied, from that of the recommended dose rate, there must be an objective justification made before doing this. For instance, the crop may be at a juvenile stage and a full dose of protectant fungicide is not warranted. The weeds could be non-wax coated and so the contact herbicide rate can be significantly reduced. Always record the justification for reduced rate application.
- 3.8 Your planned Crop Protection Policy will have outlined the steps that you can take on your farm to minimise the damage to beneficial organisms and the environment. By following these pre-determined plans and recording your activity, you can demonstrate that you have taken all reasonable precautions to target the pest and cause least negative impact to the environment and the 'Beneficials'. Think about:
- Crop Protection Product Choice
 - Which Predators are active in the crop?
 - Timing of Application
 - Where spraying stops and starts at the Headland
 - Wind Speeds
 - Rain Forecasts (run-off into water courses)
 - Persistence of pesticides
 - Side effects on beneficial insects
 - Some chemicals have low toxicological side effects but may be very dangerous for water pollution.
 - Rotation of different types of herbicides to reduce build up of resistant species to one type of herbicide.
- Applications of some pesticides have known non desired side effects – red spider, white fly outbreaks. By thinking first and acting smart: Beneficial insects and wildlife can be protected against the detrimental effects of agrochemicals.
- 3.9 Harvest intervals must be recorded, against application dates and cross correlated against proposed harvest dates, before harvest takes place. In line with GLOBAL GAP
- 3.10 A LEAF farmer must be able to demonstrate that there is control of the area that is to be sprayed and that the spraying activity does not, mainly through drift, negatively impact of people and the environment surrounding the spray zone. Consideration must be taken about;
- Wind Conditions
 - 6m Buffer Strips between fields and wildlife and residential zones
 - Training of spray teams
 - Spray application types (likely or not likely to drift/go straight to target)
 - Clear field boundaries
- 3.11 It is not permissible to cause contamination of the environment or of water, through the activity of mixing chemicals and filling up/washing out sprayers. Special areas must be constructed to contain any spillages and deal with waste water or tank washings in a safe manner. Digging pits and back filling with charcoal is a good, low cost method of constructing a catchment area which can absorb spillages and overflows. Correct construction will mean that such spillages will remain within the designated area and not migrate through ground water or surface run-off, to sensitive areas. All fill up and mixing areas must have a solid, level surface on which to work and there must be restricted access to the mixing and fill up area.

Filling areas on large farms may be positioned at various points with no restriction for access – one would expect to see: signage, first aid box (in tractor cabin), emergency/accident procedures and clean water for washing any spillage on operator.

- 3.13 Pesticide Spillages can damage both people and the environment. Even if your farm is in an area where there may be no one in authority to inform in the case of an accidental spillage, you must have an action plan which is easy for anyone on the farm to follow. Wherever possible, this action plan should lead you to call on professional help to deal with contamination. If this is not possible, then the action plan must involve those people on the farm who are trained to deal with agrochemicals. Label details on the pesticide container should give good information and direction as to what to do in the event of personal contamination. Larger scale environmental contamination must be dealt with on a case by case basis. Your biggest responsibility is to contain the spillage and stop it contaminating secondary areas.
- 3.14 It is important that your advice on pesticides is given by a trained person. Training can be to a professional standard such as BASIS or suitable training can be given as part of an agricultural engineer's course at university. Suitable training is almost always accompanied by a training certificate and it is important that any person giving a LEAF farmer advice can demonstrate (through a valid, printed certificate) that they are competent to do so. Pesticide recommendations used on the farm can be carried out by a senior crops manager, but there needs to be frequent verification of recommendation and application by the trained agronomist. An agricultural/horticultural degree would be the minimal qualification in some countries. Out of UK demonstration of continual professional development should be recorded – courses, magazines, trade fairs, meeting with pesticide companies on release of new products, biological control etc.
- 3.15 All members of the team involved with the application of pesticides, must go through a yearly course/refresher course. This can be carried out by a national or international recognized trainer, or can be carried out by a senior crops manager who has been independently trained in pesticide handling, application and personal safety. Training must be formal. It must be recorded and must be specific to the individual involved. Training should be accompanied by a basic exam so that the trainees can demonstrate suitable competence in the trained subjects. Training should be relevant to the types and methods of handling and application on the farm. So, for instance, there is no point training people how to use tractor mounted booms, if they are applying the chemical in a plastic house, with a lance. All spray team members should where available have a recognised national certificate. In absence internal training by a qualified agronomist would be acceptable providing course is planned and details of content are recorded for verification. An agricultural/horticultural degree would be the minimal qualification for training sprayer team members. The exam may not be a viable option in some countries.
- 3.16 Where schemes exist to have spray application equipment calibrated externally, then a LEAF farmer should manage this as a yearly calibration. Calibration is 'per' machine and a Certificate should be kept to demonstrate that the machine has been successfully calibrated. Where no such scheme exists, then LEAF farmers should calibrate their own machines. Spray volumes should be measured against target and any variation of 5% or over (against the expected spray volume per unit pressure per unit time), should result in a nozzle check and appropriate replacement. Not only does this contribute directly to environmental and residue management, it also saves you money through the control of application dose and the more efficacious use of the pesticide on the target organism. Document 2009/128/EC of the European Parliament and Council, provides a framework for the sustainable use of pesticides. Previous European Directives for Sprayer verification: UNE-EN 13790 (1 -2) 2003.
- 3.17 All Pesticide applications must be recorded, in line with GLOBAL GAP requirements.
- 3.18 Pesticide stores must conform to the minimum standard required by GLOBAL GAP
- 3.19 Pesticides that you have in your store must have a legal and approved use in that country for on the crops that you grow on your farm. Rules of extrapolation can apply (GLOBALGAP Annex CB.2)

- 3.20 The usage profile for any of the chemicals that are in your store must be in line with the label approval for that chemical. If, in agreement between you the farmer and your client, you have extended harvest intervals, reduced rates, reduced total number of applications allowed or extended the period of time between applications, then this can be a positive thing. You must show accountability for the use of wetters/adjuvants/penetrants as these can DIRECTLY contribute to increased residues in the product and can even lead to residues to exceed the statutory MRL in the country of sale. Records must indicate pesticide registration number where this exists.
- 3.21 Controlling Drift onto neighbouring properties, fields, crops, residential areas, livestock and people, is a factor of due care and attention. There are many ways to achieve this and each farming situation deserves consideration for its own unique solution. The straightforward win is a 6m buffer zone. Practical in some situations, impractical in others. So, a LEAF farmer should consider a number of factors and come up with an appropriate action plan. Some issues to consider in making this plan include;
- Training of spray operators
 - Careful/restricted use of mist blowers and air assisted blowers around field margins
 - Nozzle choice
 - Maximum wind velocities for spraying such areas
 - Non-Sprayed boundaries
 - Time of day for spraying these areas. The cool of evening generally reduces wind speed and spray volatilization
 - Planting of suitable 'Green Barriers' (e.g. maize) at least 2 m away from the crop, which grow tall enough to limit spray drift, if appropriate within the crop rotation strategy. Clearly though, the Green barrier becomes a part of the environment and we do not want to solve one problem whilst at the same time creating another. Generally, it is the management of a common sense approach to reduce the risk of drift into sensitive areas.

4.0 Pollution Control and By-Product Management

Principle Summary (not binding for audit purposes):

Agriculture and horticulture are no different from other industries in that nearly every process and practice results in the production of 'by-products' or 'wastes' and therefore pose a risk of pollution and threat to the environment. In many cases farm 'wastes' are a valuable resource and this section focuses on their optimum use in order to make cost savings and reduce pollution.

- 4.1 It is always a good plan to get professional help with the planning of the Pollution Control Strategies for the whole farm. LEAF recommends that you do so. However, in the absence of any professional help, there is nothing to prevent you from assessing which waste products are produced on the farm and the potential for pollution to contaminate the farm and the environment outside the farm. The planning of your control strategies starts here.
- 4.2 Waste minimization is not only a key factor in the profitability of the business; it is also a key factor in utilizing resources on the farm and preventing pollution and contamination. Whilst not aimed at farmers outside of the UK, the following document may well give you ideas as to how to minimize waste on your own farms.
<http://www.defra.gov.uk/environment/waste/topics/agwaste/wasteminimisation.pdf> Like many of the auditable points in the LEAF MARQUE standard, the question that most growers have is, 'where do I start with this'? The waste minimization document helps farmers to break down the categories of their farming and to focus on the key areas. A good place to start is looking at costs, purchases and the consequences of some purchases. For instance:
- What have we purchased in what quantity?
 - How much of the usable part of the purchase was used?
 - How much of the purchase was packaging?
 - Could we have minimized waste by buying less quantity a little more frequently?
 - Could we have minimised waste by buying the same quantity in 'bigger units'?

Or

- How much green waste and manure was produced?
- How much of this was composted?
- What is the nutritional value of the compost?
- How much inorganic fertilizer was purchased?
- How much could we have off-set against this purchase by proper composting?

Water is a most precious substance of commodities, whether or not you have to pay for it. One of the first areas to look at is the waste of water through leaks and poorly maintained nozzles/jets/sprinklers. These and many more themes should be explored. Remember, waste is not only bad for the environment; it costs the farm money as well.

- 4.3 The manure management plan is applicable to those farmers who use any form of nutrition other than inorganically synthesized nutrition. The plan will list the types of manures that will be used on the farm (animal and vegetable), the way in which the manures will be used, the storage conditions for the manures, the controls in place for the prevention of pollution and contamination to other parts of the farm, the controls in place to prevent contamination of crops and the controls in place to prevent contamination of water. One of the main methods of achieving control is through mapping out the farm into areas of usage, storage, non-usage and critical contamination areas.

All applications, timings and quantities must be recorded.

Manure Management Plans should be integrated into the Nutritional Management Plan, as a whole.

There could be situations where liquid commercial organic material is used bought in bulk 1000lts tanks and applied through irrigation system. This type of material has an N: P: K content and is used as a soil conditioner. This will need to be recorded and contemplated in nutrient balance and stored correctly.

- 4.4 Bunding of the fuel tanks. For all tanks above 200 litres a bund must be constructed. Quite simply, a bund is a low wall that is sealed sufficiently enough to contain liquid (in this case oil & petroleum products). Most farms which have the need for 200 Litre plus tanks, have the capacity to build walls on the farm. How high to build the wall depends upon the length and breadth of the walls and the corresponding volume that they contain. Aim for around 10% more volume containment than the maximum capacity of the tank/containers. Make sure that all of the taps and outflows from the tank are within the bund boundary.

Where the fuel store is not a permanent tank, but moveable units (such as 40 Gallon Drums), then there needs to be movement of units in and out of the bunded area. In such cases, it is feasible to construct a vertical sluice in the form of an entrance into the bunded area. A properly constructed sluice, slotting into a flanged housing, will make a doorway when removed and seal the bund when slotted in place.

LEAF farmers should ensure that the bunded area is more than 10 metres away from areas of high risk contamination such as open drains and ditches.

There are specially prepared doubled walled 1000 litre tanks for diesel storage that will not require bunding. These must have a pump with a top unload system-otherwise leakage around the entry point into the tank will still occur.

The bund and base must be impermeable and last for 20 years with routine maintenance – Evidence of this will be recorded inspections and any building regulations / certificates. Every part of the store must be within the bund. Taps and pipes must point downwards and be locked shut when not in use.

The Construction Industry Research and Information Association (CIRIA) report 163, on the construction of bunds for oil storage tanks, explains how to build good quality bunds.

<http://publications.environment-agency.gov.uk/pdf/PMHO300AYCK-e-e.pdf?lang= e>

You need to make sure your bund is built properly; it must be able to withstand total failure of a full tank.

See also: <http://www.netregs.gov.uk/netregs/businesses/agriculture/61867.aspx>

- 4.5 In Line with Good Agricultural Practice, all application machinery must be maintained & calibrated regularly. Records must be kept for each vehicle or machine.
- 4.6 Through the whole farm map showing water courses and environmentally sensitive areas, it is possible to plan carefully for the disposal of wastes and by-products. It is essential that wastes and by-products do not pollute the environment. Farmers should demonstrate that careful planning has gone into the disposal of wastes and by-products
- 4.7 As outlined.
- 4.8 The action plan on the reduction of the impact of potential pollutants on the environment should be conducted in the form of a risk assessment.
- So,
- Pollutant Name
 - Pollutant Type
 - Pollution Potential (Air, Soil, Water, People)
 - Pollution potential activity (Application, Disposal, Storage, Handling etc.)
 - Pollution Risk Reduction method employed (or aimed for)
 - Monitoring Method Used
 - Corrective action sequence to be actioned in the event of a pollution issue.
- 4.11 As outlined.

5.0 Energy Efficiency and Water Management

Principle Summary (not binding for audit purposes):

LEAF is committed to the efficient use of fuels and energy and water on farms, in particular the improvement of the on-farm energy balance, for both environmental and economic reasons and using water from sustainable sources. CO2 is the most important greenhouse gas and farmers can minimise its production by using energy as efficiently as possible.

- 5.1 The energy efficiency audit should be broken down into the activities on the farm that use energy. This is an audit that can be completed internally on the farm.

Plan, do, review: Like all audits, it looks at what is currently happening on the farm in terms of energy usage and then looks at ways to improve efficiencies by reducing inputs whilst at least maintaining outputs.

Definition – An energy audit identifies and evaluates energy management opportunities on the farm. During an audit, a baseline is developed to characterise and record energy use. Individual unit operations, processes, and major energy-consuming equipment are evaluated to identify energy management opportunities and high-return-on-investment projects. Typically an action report is produced that describes the baseline, each conservation opportunity area, an estimate of the cost to implement the changes, the savings that will be generated, and an estimation of the payback period.

Look at electricity/gas consumption for the farm. Benchmark units used over the last 12 months and put in the action plan to reduce consumption over the next 12 months.

Tip: Look at bulb type, insulation, thermostatic settings, timer settings, maintenance of equipment. Where power, light and heating/cooling is used directly in the production of the crop, correlation can be drawn of units of energy used against volume/weight of product harvested and sold. How can this be made more efficient in a forward looking plan?

Vehicles that are correctly maintained and serviced against a pre-planned schedule, are more likely to be fuel efficient than those that are not. Fuel usage against hours worked, over a period of a year, can form part of a useful guide to the efficiency rating of farm vehicles. Properly insulated cold rooms, with doors that can and are shut when not being used, are significantly more energy efficient than those that are not. All of these factors directly contribute to the improvement of energy use and all can be assessed and targeted in your energy audit.

Hint: How about evaluating the potential for the production of energy from the natural resources on the farm? What is the potential for a heat pump? What is the potential for a small Hydro-Power scheme? What is the potential for a wind turbine?

Lighting from solar energy in non working areas – toilets, corridors, archive store, pesticide, fertilizer stores etc.

Solar panels for hot water supply are a possible energy alternative as well as the latest renewable energy innovations.

5.2/5.3 As outlined.

5.4 A Yearly Reviewed Water Management plan is an essential tool for the accountable use of water on the farm. LEAF encourages the farmer to think along the following lines and to act to prevent any unnecessary use of water.

A farmer must be able to demonstrate that the water that is being used on the farm is covered by the appropriate licenses and, if no abstraction licenses are needed, evidence must be kept on file that this is so. You might also want to consider the ‘Riparian’ rights and responsibilities of any watercourse.

<http://www.surreyheath.gov.uk/environment/floodingdrainage/rightsandresponsibilities.htm>

Where crops are watered, farmers must be able to demonstrate that the most appropriate system of irrigation for both the crop and for water efficiency is being used or is in the plan to be used in the near future. Irrigation plans should also be drawn up to demonstrate a working plan for irrigation timing that is both agronomically right for the crop as well as lower risk evaporation potential.

Schedules should be backed up by agronomically acceptable data such as: tensiometer, evapotranspiration, weather data, and water/soil conductivity for leach of salts. Where possible water consumption should be recorded and bench marked against previous years. (See 5.7) Water storage in areas where water may not be readily available throughout the year is a factor to be considered to assure compliance to full cropping cycle.

Farmers should be able to demonstrate that there is a working maintenance schedule of irrigation machinery and equipment that actively looks at prevention and repair of leaks in the system. Irrigation should be timed and controlled so as to cause least risk of runoff and water wastage. Run-off and wastage can be mitigated through slope and contour management, for instance.

The water management plan should also manage discharges of used water back onto the farm. This links in with the pollution control management plan.

Hint: Can discharged water be organically processed through a Reed Bed System? Relatively inexpensive to set up, foul water enters the system and clean water exits the system. This is a natural way of reintroducing water back into the environment.

<http://www.eco-web.com/index/category/2.1.1.html>

http://en.wikipedia.org/wiki/Constructed_wetland

<http://www.bio-pro.de/en/region/biolago/magazin/02422/index.html>

5.5 -5.7 As outlined

5.8 Helping to improve water efficiency having measured changes? By adopting Integrated Farm Management (IFM) LEAF Marque farmers follow a set of principles across the whole farm in order to deliver a more sustainable business. Water efficiency can be improved by in many ways. The LEAF Marque standard and the standards that it builds on encompass best practice in an integrated way to help improve the farms water efficiency.

LEAF Marque farmers must measure water efficiency based on yield and implement a plan that aims to improve sustainable water use (5.7). Water resource can be defined as natural rainfall, subterranean water (water table) or impounded water. Irrigated water can be from natural sources such as boreholes, rivers etc these would be depleting natural sources, impounded water stored during abundant periods of flow or rainfall are more sustainable and should be encouraged. Natural water i.e.

rainfall, needs to be managed to gain optimum efficiency i.e. ensuring that all natural water is utilised efficiently through maximising soil capacity and reducing runoff, evaporation and transpiration. LEAF Marque growers should maximise water storage of wasted water i.e. capture rainfall, flood water and capture water during abundant periods of flow all within local laws.

It needs an integrated approach, there is no one solution, it's the combination of measures that will ensure optimal use of the water resource, and these are some of the practices that can be considered to help farms improve water efficiency in crops:

- Soil water monitoring and scheduling such as tensiometer, neutron probe or EnviroSCAN
- Best practice in soil management for optimal soil structure for maximising water holding capacity.
- Maximising organic matter content will aid good soil structure and improve water holding capacity
- Variety choice, choosing varieties that utilise water more efficiently.
- Crop systems will impact on the efficiency of natural water and irrigated water
- Nutrient balancing will have an impact on optimal plant condition and growth.
- Water stress will be reduce through good plant husbandry
- Heat stress can be reduce through different practices such as crop covers
- Stress chemicals, anti stress chemicals will aid plant condition during drought periods and maintain root growth
- Reduce wind evaporation through reducing wind speed by the use of windbreaks
- Use of soil mulches to reduce evaporation
- Soil improvers such as compost
- Ground cover plants used as soil stabiliser and subsequent mulch
- Green manures
- Water footprint embedded water use of inputs
- Canopy management to reduce evaporation and transpiration
- Crop load management for optimal utilisation of natural soil water
- Weather forecasting coupled with soil monitoring to avoid over irrigation
- Field monitoring for plant stress using infrared photography to identify inefficiency of irrigation or natural water availability
- Precision measurement and application of water
- Breeding drought resistance into plants
- Biological activity in soil
- Use of rhizobacteria in dry soils, naturally occurring bacteria
- Cultivation choices i.e. minimum tillage

5.9 Water is a precious commodity / resource and therefore conserving it in a multitude of ways will reduce your reliance from direct abstraction or using the mains supply. Therefore, your answers from <http://www.leafuk.org/myleaf/services/Questionnaires.eb> should be used to monitor your water storage from other sources.

6.0 Landscape and Nature Conservation

Principle Summary (not binding for audit purposes):

Care for the environment is at the core of IFM, and for many people the demonstration of this care is a living farm landscape that enhances people's experience of the countryside. Conservation and landscape issues cannot be bolted on to the farm management as an afterthought; they must be totally integrated. Landscape and conservation are becoming increasingly important in agriculture. It is important to remember that landscape and wildlife are like any other product of the farm; what is achieved depends on the starting conditions.

6.1 **The Whole Farm Conservation Audit:** A fundamental approach to LEAF MARQUE, is through the understanding of the environmental features associated with your farm. LEAF recognizes that there are very many different types of farms around the world, ranging from farms of many thousands of hectares in the Veld of Southern Africa, to small sub hectare parcels of family owned land in South East Asia, to single half hectare greenhouse structures amidst thousands of other greenhouse structures all crammed together in the same area of Southern Europe.

Thus, there cannot be a single blueprint for a whole farm conservation audit, but each farming business can become aware of the distribution of key wildlife habitats, the species of plants and animals that can be found on and around the farm and the key features on the farm. The purpose of the audit is to become aware of these and then use this information to plan a profitable farming business which is in balance with a conservation and environmental enhancement plan.

Farmers and growers can use any or all of the bullet points in the following list to base their audit on. Perhaps one of the best ways to collate the information generated by the audit is to draw up a scale map of the farm and to mark in the features accordingly.

Wetlands, Lakes, Ponds, Rivers and Streams: Where are they and how are they associated with the farm? Is there a seasonal rise and fall in water levels? Does outflow from the farm drain into these areas? Is there a drying up period of the year where there is no water?

Associated Flora & Fauna: Which animals, birds and plant-life are associated with these water courses and wetlands? Identification, mapping and number counts are important in your audit.

Species mapping: The same principle of a map based audit can be used for the general mapping of animals, birds and plant-life. A good plan here is to integrate together the mapping of main species. For instance, in un-cropped land such as woodland areas you can integrate the tree species mapping with the main mammal and bird species to be found there. Build into this, the main plant species prevalent there and you have managed an integrated audit of a key area of a farm.

In smaller farming units (even those under one hectare), the boundaries between fields and farms are usually important areas to map during any audit. Boundary areas often contain a diverse mix of plants, trees and wildlife and are an important part of conservation planning for the future. Greenhouse and plastic house structures can often be stand alone and completely un-associated with the natural features and natural flora and fauna associated with open field production. However, it is still possible to look at conservation here. Consider water catchment during rains. Consider un-cropped areas that can be planted. Consider water run off areas, from in-greenhouse watering. Think also about the encouragement of raptor species as an integrated control measure for rodents. These and many other factors can be included in an audit. It matters not that there may be nothing in place at the time of the audit. What matters is that you are considering these areas of conservation and environmental enhancement and the result of the audit can be positively used in the whole farm conservation plan.

It is expected and understood that some concentrated agronomic units will have little or no boundaries, or area of known conservation interest. However these areas will not be excluded from this section; and instead efforts should be clearly made to demonstrate that management and staff maintain a proactive approach to conservation, and help manage another local area that is suitable and notable for conservation interest. This can take the form of donating time and or money in supporting this initiative; or supporting an existing local conservation group. In some cases it may also be possible for a local area to be developed to maintain local flora and fauna; with a long term plan on how to develop this site. This could be shared with other local Leaf Growers. Whichever strategy is followed it is expected that local expert advice is sort to ensure resources used are for the best purpose to enhance the conservation value of the area.

http://www.leafuk.org/resources/000/309/883/FWAG_template.pdf

6.2/6.3 The Whole Farm Conservation Plan: This is firmly based on the results of the audit. The audit shows, from an environmental perspective, the natural species and landscape of the farm. The conservation plan that is put in place is a one to five year plan outlining the farm's policy and plan for conservation and enhancement of the biodiversity on the farm. Clearly, all farms are different. There is no one plan that fits all situations. The plan that you put in place will cover the whole farm.

Some things to consider include;

- Maintaining the habitats that are already on the farm, so as to keep the farm's indigenous diversity of species intact.
- Managing these existing habitats so that invasive species do not take over and destroy the natural balance.

- Maintenance of fire breaks, so that wild fires in the dry seasons do not destroy large non-cropped areas of the farm
- Careful maintenance of ditches, dykes, drains and watercourses so that these important areas allow for the development of diverse flora and fauna, but are not allowed to silt up or clog up and become ineffective in taking water away from cropped and un-cropped areas.
- A phased plantation programme of indigenous species. It is especially important to understand the likely consequences of planting certain species of plants and trees, before embarking on a planting programme. Think about the invertebrate species attracted to plant and tree species. Are these likely to be pests that cause damage crops, or predators that help you manage the pests that are there. You should also consider the growth habits and water usage/root habits of large shrubs and trees. Is the tree likely to shade out the crop? Is the tree deep vertical rooted or shallow lateral rooted? How will this effect crops? Is there any toxicity linked in with the plant or tree being considered for planting. How does this sit with your livestock management? What can be planted at and around outflow areas, which efficiently utilize outflow water leading to less ‘pooling’? How can outflow areas been landscaped to achieve the same result? Less pooling leads to fewer mosquitoes, so leading to Malaria reduction in many parts of the world.
- Thoughts about a plantation programme that will encourage beneficial indigenous animal species to come on to and multiply on the farm. Use of indigenous species is ideal – consideration can be given for species that are also host plants for beneficial insects.
- Farming activities that, as far as possible, work to conserve the indigenous species on the farm. For instance; spraying activity that ensures insects such as bees are not foraging when sprays are being applied. Land tillage that is delayed until ground nests have been vacated at the end of the breeding season. Solarization as opposed to fumigation.
- In situations where there are reduced possibilities, bird life and use of artificial nests is recommendable. This occupies very little space and has a low cost. Some species may be protected and this is a positive contribution for their survival. Bats and owls are examples of a beneficial species on the farm and can be encouraged using bat boxes and artificial nests. Where possible, LEAF encourages farmers to use the services of specialist advisors. The input from these experts when the conservation plan is being drawn up can be invaluable.

6.4 Environmental Impact Assessments (EIA) are a prerequisite prior to bringing in virgin or semi-reverted land into your cropping programme. For those farmers who are farming in regions that are governed by legislation that covers conversion of such land into cropping land, then the relevant authorities must be informed and the necessary permissions must be obtained.

All LEAF farmers are required to assess the impact of the conversion of non-cropped land into cropping land. The key is to minimise the negative impact of such a change. There will inevitably be clearance of vegetation and some destruction of vertebrate and invertebrate habitats. There will be the addition of fertilizers, the potential drainage of the site and the exposure of the site to mechanization and tillage. Farmers can mitigate the impact of such changes, through conservation planning for the new site (Note that all plans for virgin and reverted land that is earmarked to be changed to cropping land, must be approved by the LEAF Technical & Advisory committee PRIOR TO the commencement of any activities on the site). The EIA should highlight the conservation disadvantages to the change of use plan. Farmers can then plan to replace and integrate some of the lost habitat, so that the overall impact on the site is significantly less than would have been with the complete removal of the natural habitat.

LEAF recognizes that new lands have to be brought in to the farming plan. However LEAF encourages the promotion of biodiversity on these new lands, as opposed to a complete clearance into a monoculture environment.

6.5 It is very important that traditional field boundaries and existing landscape features are neither removed nor destroyed to make way for farming activities.

6.6 Aggressive field boundary management must be timed to ensure minimum negative impact on the wildlife species that inhabit those field boundaries.

Examples of how to manage this include:

- The audit of the species that inhabit these boundaries

- The understanding of the importance of the boundaries to these species, at the various stages of the year. So, does a key beneficial invertebrate use this boundary as part of its life-cycle? If so, does cutting back the boundary destroy the invertebrate or its key environment and so limit its effectiveness for you, against economically damaging pests, on your farm?
- The understanding of the importance of the boundary to provide nesting cover for a certain period of the year. Will the activity at the boundary adversely affect that?
- The understanding of the invasion of toxic plants to that boundary and the negative impact that this will have on your livestock if there is no timed control.
- The understanding of the impact of cutting back the boundary, on the food source provided by that boundary; seeds, berries, insects, pollen, nectar etc
- The understanding of the role that boundary has on wind protection and the seasons where wind can damage crops and the quality of the produce from those crops.
- The role that the boundaries have at the time of flowering, offering a more attractive source of nectar for bees and the dramatic negative impact that this can have on the pollination of the commercial crop.

Impact studies of aggressive boundary management must be made and the appropriate timings and restrictions put in place, before the work is done. This forms part of the conservation management plan and is very much an Integrated Farming Policy.

- 6.7 Water Course Management must also be assessed and timed. Both natural and artificial water courses are natural habitats for wildlife. By dint of the fact that there is usually plenty of water associated with the water course, there is often a rapid growth of vegetation which in turn forms a good natural habitat. Using the same approach that was used to aggressive field boundary management, farmers should understand the impact of water course clearance, dredging and habitat destruction. This must be integrated with the sensible and practical approach to keeping watercourses functional for the prevention of flooding. The most balanced approach involves regular maintenance in line with good water management. Farmers must not burn vegetation to clear the banks of waterways. Wherever possible, waterways should not be completely cleared of vegetation and, where appropriate, vegetation should be allowed to drop seed before it is cut back. Dried river courses should be considered in the management plan. These areas often are habitats for animal and plant life and should be correctly managed and protected from farming activities.
- 6.8 Mature trees should, wherever possible, be left in situ on the farm. If older trees must be felled, then appropriate licenses must be obtained from the relevant authorities wherever such restrictions are in place. As part of the whole farm conservation management plan, there can be a planned removal of non-indigenous trees, which disrupt the environmental balance, which is offset by an indigenous tree planting programme. Semi-Mature and Mature trees that grow in areas of reverted/virgin land that are being converted to cropped land must be left untouched unless the position of the tree clearly conflicts with the planned farming operation. A clearly written impact assessment must be produced to justify the removal of the tree and provision must be made to at least replace the tree on a one for one basis. Photographic evidence to support the justification to remove a tree would be a sound idea. Protected trees in regional or national conservation areas must not be felled. LEAF encourages the planned planting of indigenous tree species on LEAF farms.
- 6.10 Deep cultivations around trees damage the roots and can lead to the death of the tree. Approximately 90% of a tree's root system (feeder roots etc) is in the top 36 inches of soil. You can get an idea of the radius of the roots on a mature tree from a simple calculation called the Critical Root Radius. So; at a height of 4½ feet (135 cm) from the ground, measure the diameter of the tree (in inches ... where 1 inch is 2.5 cm). Take the result as a figure in inches and multiply the result by 1.5 feet. This gives the Critical Root Zone radius from the centre of the tree. As an example, a tree that is 12 inches in diameter should have $12 \times 1.5 = 18$ feet radius of critical root zone protection, or a circular diameter around the tree of 36 feet. (1 foot is 12 inches or 30 cm).
With this knowledge a farmer can plan the limit of the cultivations in proximity to the tree. Not all trees are the same, but this general rule gives general guidelines for root protection and should lead to the preservation of a healthy tree in a farming environment. Trees that have been deliberately planted as

shade or hedgerow trees can sometimes be a great deal closer to cultivations than this guideline allows for. Identification of these trees in the whole farm conservation plan will lead to planned management of these 'utility' trees.

- 6.11 LEAF farmers must aim to develop and maintain two metre wide undisturbed field margins around all of their field boundaries. However, this is not always a practical option for all farmers. LEAF recognizes that there may be a need to offer derogations to this 'Must' Requirement. For Smallholder Farmers who farm in a very traditional way, there can often be no more than the width of a man's foot between fields. In areas of intensive protected production in Southern Europe, very often the only boundary between different farmer's production units are the plastic walls of the two plastic houses. So, for farmers who have fields no larger than 2 Hectares, there is no need to create this 2 metre boundary.

Where fields are more than 2 Ha, this field margin does need to be created.

The aim of the 2 metre margin is to protect the natural boundary feature from agrochemical and fertilizer contamination, and protect the natural flora and fauna associated with the natural boundary from being disturbed. The margin also provides a 'corridor' for natural wildlife to travel between different areas of the farm.

This situation is common in South east Spain, where field boundaries are evident on large farms but due to extremely low rainfall no or very little vegetation exists to protect. Irrigation of these areas would not be viable as water is scarce. Normally man made reservoirs are present for water storage and may be considered as a conservation area (birds/fish/reptiles plantings on side walls) in substitution of the 2 meter strip. However where there is something to protect – example of boundary with dried river course, the 2 meter strip is obligatory.

LEAF requires a farmer to preserve the natural boundary and, where appropriate, plant new boundaries and tree-lines. However, there will be some farms, for instance in North Africa, where there are no natural boundaries to fields over 2 Hectares. Whilst LEAF encourages a farmer to create natural boundaries and the associated boundary strips (as part of the conservation development plan) it may often be inappropriate to do so. LEAF can, in these cases, consider issuing a derogation to the rule (Margin Offset) if the farmer can demonstrate that a suitably sized conservation area, planted with indigenous species, has been created and managed elsewhere on the farm. A target area for a suitable sized conservation area should be equivalent to the area that would have been put aside to the 2 metre strip along the margin of each field in excess of 2 Hectares.

- 6.12 Where field margin strips exist, they should be managed naturally. There should be no additions of pesticide or fertilizer. Irrigation can be applied if it is appropriate to do so. If the natural growth of grasses in the wet season, leads to a fire hazard in the dry season, then grasses and other dried plant material should be cut back and bundled after seed has been shed. Noxious plants growing in these areas can be dealt with through spot treatment using an approved herbicide, but LEAF farmers are encouraged to use other methods where at all possible, BEFORE reaching for a herbicide.

6.14/6.15 As outlined

- 6.16 The 2 metre field boundary and the boundary itself, is designed to be a non-interfered with area (other than the general maintenance previously mentioned). This must be clearly indicated and clearly communicated in the Whole Farm Conservation Management Plan that you have undertaken at the farm. This should take the form of a clear directive from the farm management to all people who work on the farm.
- 6.17 LEAF farmers are encouraged to be sympathetic towards features of historical importance on their farms. In some countries, the local, regional or national authorities will have placed restrictions on the farming activities that can take place at or around these features. LEAF expects farmers to abide by these restrictions. In other countries, LEAF farmers are expected to recognize and map out these features and make reference to them in the Whole Farm Conservation plan. These features must not

be destroyed or interfered with in any way. Examples include historical; water channels, buildings/ruins, settlements. Historical could be interpreted as more than three generations back.

- 6.18 LEAF farmers are encouraged to allow flora and fauna to thrive on non-cropped land, rather than take the option of land clearance. This has the benefit of encouraging a bio-diverse environment as well as holding soils together to limit erosion.
- 6.19 If, as part of your conservation plan, you map out the bird and animal species that live on your farm, you can get an idea of when these species will be fixed to one spot for nesting, breeding etc. LEAF requires that you recognize this and adjust/modify farming activities as much as possible to avoid disturbing/killing these species. It is a question of identification, marking up and avoiding areas of the farm at any given, critical time. Through the provision of suitable habitats in non-cropped areas of the farm, this issue can be mitigated. Some annual crops may be present during the nesting period or are been harvested, this should be documented (crop planning) and included in the conservation plan and compensated using the provision of other suitable habitats in non-cropped areas of the farm. Pruning of some Fruit Tree crop species should be considered and adjusted to avoid disturbance of nesting species as orchards provide a valuable habitat of all bird species.
- 6.20-6.22 As outlined
- 6.23 On the basis that few landlords will be LEAF MARQUE accredited, it will generally fall to you the farmer to carry out the environmental assessment of the land. The land should be brought into your Conservation Management Plan, but the activities that you plan should be commensurate with the length of the lease. So, the land should be farmed sympathetically with your whole farm Integrated Farm Management plan, but LEAF encourages you to be pragmatic with expenditure. When the land reverts back to the landlord, it should be in an enhanced environmental state compared to when it was leased out.
- 6.24 LEAF farmers should not restrict nor prohibit the movement of people across their land, where the people have a traditional or legal right to move across that land.
- 6.25/6.26 As outlined.
- 6.27 As recommended. Clearly, if you have adopted IFM and have become LEAF MARQUE accredited, you need to clearly direct the IFM policies that need to be adopted by any tenant for the period of the lease.

7.0 Animal Husbandry

Principle Summary (not binding for audit purposes):

Under an IFM system, consideration is given to the way decisions are made on the whole farm. Not only does this include animal welfare, grassland, forage and crop management, but also the attention to detail demanded in order to ensure sound animal husbandry techniques, environmental responsibility and an economically viable farming business.

- 7.1 The efficient utilisation of grassland and forage crops is a key element affecting grazing livestock productivity and profitability. Planned grazing management should help to ensure a supply of good quality forage while helping to minimising poaching and soil erosion/runoff. Particular attention should be given to strip grazing where regular movement of an electric fencing is required so as to reduce poaching and the risk of soil erosion/run off. Grazing under wet conditions can result in poaching, increasing sward deterioration, increasing the risk of compaction, generating runoff and soil erosion. The removal of livestock either temporarily or permanently from areas, which are sensitive to erosion should be considered. This could include fencing riparian areas, relocating feed/water troughs to hardened areas and provision of shelter away from steep slopes or wet areas. The installation of purpose-built livestock tracks can also reduce the amount of poaching and provide improved access to grazing areas.

- 7.3 To reduce the risk to wildlife, cutting operations should be undertaken from one side of the field to the other or cutting from the middle of the field outwards. Try and reduce the number of operations so as to reduce disturbance to wildlife, particularly ground nesting birds.
- 7.4 Slurry storage facilities should be capable of storing a minimum of 4 months including rainwater. (This maybe greater within nitrate vulnerable zones) Slurry tanks must have a minimum freeboard (reserve volume) of 300mm while earth banked slurry lagoons must have a freeboard requirement of 750mm. Storage capacity must be sufficient to avoid pollution. All new stores In the UK new or substantially enlarged or altered structures since Sept 1991 must meet the requirements of the Control of Pollution (Silage Slurry and Agricultural Fuel Oil) Regulations 1991 (as amended) or relevant legislation in other countries.
- Even small amounts of silage effluent have the potential to cause significant pollution. All silage effluent should be stored and disposed of safely. For silage made in silos a silage liquor tank with a capacity 20 litres per cubic metre of silo capacity (up to 1500 cubic metres and then an additional 6.7 litres per cubic metre thereafter) should be provided. It is essential to plan the handling and use of manures on a farm. This will ensure that good use is made of the nutrient content and organic matter in manures and that the risks of causing environmental pollution are minimised. Defra’s Code of Good Agricultural Practice for the Protection of Water provides guidance on how to prepare a Manure Management Plan. This plan will help in deciding when, where and at what rate to apply solid manures, slurry and dirty water thereby reducing the risks of causing water pollution and transfer of pathogens to water. You should regularly review and refer to your manure management plan before applying manures.
- When planning manure and slurry systems, information is needed on the quantity and nutrient content of animal manures produced on a farm. Exact specifications and design depends on a number of factors, including the number and type of livestock, the diet and feeding system, the volume of dirty water and rainwater entering storage facilities, and the amount of bedding used. Although the volume of manure to be managed will vary considerably with the amount of water introduced into the system (often doubling the volume of slurry to be handled), estimates of the quantities of excreta produced by livestock is a useful basis for planning purposes.
- 7.5 Adequate storage of animal manures and slurries is essential so as to avoid polluting surface and groundwaters. Where less than 4 months storage is provided, a manure management plan should be prepared to make sure that the lower capacity is sufficient to avoid pollution. Organic manures can present a considerable environmental risk if not handled carefully, however they are valuable sources of organic matter and plant nutrients which can result in large fertiliser savings. Manure management plans should be used in conjunction with a nutrient management plan and regularly reviewed.
- 7.6 Dirty water is an effluent consisting of water contaminated by manure, urine, cleaning material, crop seepage and other waste products. It is potentially up to 10 times more polluting than domestic sewage and causes a large proportion of farm pollution incidents. It must be collected and disposed of without causing pollution. Water pollution by dirty water can be avoided by ensuring sufficient storage and choosing the correct system for its disposal. One of the guiding principles of slurry and manure management is to cut down on the volume of dirty water and the need to handle it. Buildings that are not fitted with gutters result in clean water discharges onto dirty yards. Run-off from clean areas needs to be intercepted prior to flowing onto dirty areas. Many farms have drainage systems taking both clean and dirty water, increasing the volume that needs to be collected, stored and disposed of safely. Action taken to separate clean and dirty water will help reduce both the costs of storage and application.
- 7.7 Grazing livestock and associated activities play a key role in the maintenance of many semi-natural habitats including grassland, heath-land and pasture-woodland. The avoidance of under or over-grazing (well managed grazing) in general can deliver environmental benefits. Cattle and mixed grazing will produce a more diverse sward structure of plants, invertebrates and birds. Sensitive habitats that can

be damaged by livestock access and grazing e.g. woodland and riparian areas should be identified in your Whole Farm Conservation Plan and appropriate action taken to protect these areas.

- 7.8 A health plan demonstrates how you intend to manage your animals' health. The health plan should demonstrate how to prevent, reduce the risk of introducing disease and recognise, treat and control existing conditions so as to keep livestock healthy. A health plan should be developed in conjunction with your vet. It is important to keep records and review the progress of the health plan at regular intervals. Further information can be found at <http://www.defra.gov.uk/foodfarm/farmanimal/fhp/about.htm>
- 7.9 It is important to regularly review (at least on an annual basis) animal health and welfare issues with your vet. Good records form the basis for reviewing any herd/flock health plan, these maybe recorded in a diary or preferably as computer records. A good farmer-vet relationship is important as this will help to make sure progress against the initial targets set out in the health plan is being achieved. This will help to ensure herd/flock performance is improving. The review also presents an opportunity to amend the existing plan in the presence of new challenges.

Glossary

Here is a list of some of the terms used in this document and the LEAF Marque Standard:

Acre, (Ac): A unit of area. One acre is 4840 sq yards, 0.00156 sq miles, 0.405 hectares.

Agroecology: The study of the interrelationships of living organisms with each other and with their environment in an agricultural system.

Audit: A systematic, independent and documented process for obtaining evidence and evaluating it objectively to determine the extent to which specified requirements are fulfilled (*Source: ISEAL Alliance*).

Beetle banks: These provide mid-field refuges for predatory insects and spiders which over-winter there and then invade the crop in the following spring to eat pest species such as aphids.

Biodiversity: The total complexity of all life, including not only organisms but also their behaviour and interactions.

Biological control: The practice of using beneficial organisms—such as insect predators or parasites of pest insects, pest disease agents, insect-eating birds and bats—to keep pest populations at a tolerable level.

Break crops: Crops grown between periods of continuous cultivation of a main crop, eg stubble turnips

Carbon dioxide sequestration: The capture of atmospheric carbon dioxide (CO₂) in a solid material (such as growing trees, other vegetation, and soils) or a carbon sink through biological or physical processes, such as photosynthesis. CO₂ sequestration is one of the means to mitigate the accumulation of greenhouse gases in the atmosphere released by the burning of fossil fuels.

Catch Crop: A crop grown to hold on to, or catch, excess nutrients still in the soil following an economic crop. Rather than being leached from the soil, the nutrients are taken up by the catch crop and then returned to the soil when the plants decompose.

Certification Body: A body that decides about the authorization, suspension or cancellation of a *LEAF Marque* farm or LEAF Producer group certification. The Certification Body subcontracts inspection bodies and controls the quality of their functions.

Certified Products: Crops and the products derived from them, produced by a certified farm for commercial purposes. This includes processed or semi-processed products that have not been mixed with products from non-certified farms.

Companion Crops: Crops that are planted close to one another to achieve some mutual benefit such as repelling insect pests or attracting beneficial insects, shade, wind protection, support, or nutrient enrichment.

Conservation headland: The outer area of the cropped area of a field that is managed for wildlife. Conservation headlands are also a refuge for rare and declining plants.

Continual Improvement: Recurring activity that has the effect of increasing the ability of a group to fulfill specified requirements. The process of establishing objectives and finding opportunities for improvement is a continual process, based on risk assessment, audit findings, management reviews and other means (*Source: ISEAL Alliance*).

Cover Crop: A crop grown to prevent soil erosion by covering the soil with living vegetation and roots that hold on to the soil. Cover crops are also grown to help maintain soil organic matter and increase nitrogen availability

(green manure crop), and to “hold on” to excess nutrients (a catch crop) still in the soil following an economic crop. Other benefits of cover crops include weed suppression and attraction of beneficial insects.

Crop Rotation: The practice of planting a sequence of different crops and cover crops on a specific field. Crop rotations can be used to help build soil fertility, reduce insect pest pressure, and suppress weeds.

Document: Information and supporting media. The media may be paper, samples, photos, or on magnetic, optic or electronic disk.

Drift: The deviation of particles from their intended direction during agrochemical application due to air currents.

Economic Threshold (Integrated Pest Management): The level of infestation or pest attack at which the benefits received (for example, in terms of yield or crops saved) cover the cost of the treatment or application.

Environmentally sensitive areas: The designated areas which will safeguard and enhance areas of land that have particularly high landscape, wildlife or historic value and where possible improve public access.

Erosion: The removal or displacement of soil caused by the movement of water or wind. Severe erosion implies the removal of the entire plough layer or "A" horizon (topsoil) of the soil.

Fallow: Resting land from deliberate cropping, not necessarily without cultivation or grazing, but without sowing.

Farmyard manure (FYM): livestock faeces and urine mixed with straw or similar material used as bedding.

Forage: Leafy crops fresh or preserved, utilised as feed for animals

Free range: A system of poultry or pig keeping in which the creatures are allowed to range over a large area rather than be kept indoors all the time

Grass Strips: Strips that are used adjacent to water courses and help farmers and growers to meet pesticide regulations. The best use of a grass strip is in the field margin (so this could be against a hedge, a wood, another field or a water course). They are usually between 1 and 2 metres wide. Farmers try to ensure fertiliser does not go on grass strips and keep management to a minimum. Tussocky perennial grasses are the best for wildlife and cost-effective management.

Greenhouse gas: A greenhouse gas is a gas that contributes to the natural greenhouse effect. The Kyoto Protocol covers a basket of six greenhouse gases (GHGs) produced by human activities: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride (*Source: European Environment Agency. Environmental Terminology and Discovery Service (ETDS)*).

Green Manure: a cover crop grown to help maintain soil organic matter and increase nitrogen availability. Legumes are often used because they have rhizobial bacteria living in their root nodules that are able to fix nitrogen from the air and add it to the soil. Grasses grow quickly, providing biomass good for increasing organic matter.

Habitat: The area of an environment where an organisms lives, feeds and breeds

Hay: Grass or other plants, such as clover or alfalfa, cut and dried for fodder.

Hectare, (Ha): A unit of area measurement. One hectare is 10,000 square metres, 100 ares and 2.47 acres.

High value ecosystems: Natural ecosystems of special importance to environmental conservation, such as habitat that enables the reproduction of endemic and endangered species or hosts viable wild animal or plant populations; provision of ecosystem services such as watershed protection in serious circumstances; or rare

ecosystems. Examples are primary and secondary forests, bush and grass lands, streams, rivers, pools, lakes, lagoons, swamps, marshes and bogs.

Humus: Well-decomposed organic matter which is resistant to further decomposition and which may persist for hundreds of years. Humus holds on to some nutrients, storing them for slow release to plants.

Impact: Disturbance, consequence, repercussion or similar permanent effect of a human or natural cause. Impacts may be positive or negative. They may affect a natural system, the environment, an animal or plant population or individuals (environmental impacts), or human individuals or populations (social impacts).

Integrated Farm Management: IFM is synonymous with sustainable agriculture. It balances the requirements of running a profitable business with responsibility and sensitivity to the environment. IFM incorporates total resource management, which includes practices such as waste minimisation, recycling and energy efficiency, as well as measures to reduce the use of inputs, enhance soil structure and maintain wildlife and landscape features.

Integrated Pest Management (IPM): A strategy of pest management that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and non-target organisms, and the environment. The objective of IPM is to make conditions less favourable for pest development. Pesticides are used only when the damage caused by pests is greater than the level that the farmer can economically sustain (see **economic threshold**).

Intercropping: the practice of planting two or more mutually beneficial crops in close proximity, typically as alternating rows or numbers of rows. (On a small scale, this is often called companion planting). Benefits can include insect or weed suppression, structural support, or shade.

Landscape: The visible features of an area of land, including physical elements such as landforms, living elements of flora and fauna, abstract elements such as lighting and weather conditions, and human elements, for instance human activity or the constructed environment.

Meadow: A grass field for mowing for hay or silage.

Minimal Tillage Technique (min till): Ploughing by light cultivations that do not penetrate the soil as deeply. Min till fosters soil organisms, provides a food source for earthworms and creates habitats for beneficial fauna. Also called 'non inversion tillage systems'.

Mitigation plan: A series of actions to compensate the destruction of natural ecosystems including the definition of responsible persons and specific timelines for each action. Actions include the planting of native plant and tree species, set aside of areas for natural regeneration, as well as ex-situ measures of conservation authorized by government authorities.

Mitigation: Projects or programs intended to offset known impacts to an existing natural resource, human being or community.

Monitoring: The systemic observation of changes or **impacts** to the environment due to human activities.

Mulching: the practice of spreading organic materials—such as straw, compost, or wood chips—over otherwise bare soil between and among crop plants. Mulching helps to conserve moisture, suppress weeds, and build soil organic matter.

Native Species: Those species that occur naturally in the place where they are found. For the purpose of this standard, naturalized species – exotic species that have adapted and grow and multiply as if they are native – are also considered as native if it is proven that they do not cause negative economic or environmental impacts.

Natural ecosystems: A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit (*Source: Convention on Biological Diversity*). Examples are aquatic ecosystems, such as streams, rivers, pools, ponds, lakes, lagoons, and other bodies of liquid water that exist naturally; wetlands such as swamps, marshes, mangroves or bogs; terrestrial ecosystems, such as primary and secondary forests, bush lands, grass lands or other advanced natural succession stages without significant human disturbance for minimum 10 years. Each SAN representative provides further local interpretation considering local biophysical conditions.

Natural resources: A feature or component of the natural environment that is of value in serving human needs, e.g. soil, water, plant life, wildlife, etc. Some natural resources have an economic value (e.g. timber) while others have a "non economic" value (e.g. scenic beauty). (*Source: UNUN <http://www.eionet.europa.eu>*).

Non native species: Those species not native to the place where they are found. Species introduced from other regions or areas.

Organic farming: Farming using rotation, clover, no synthetic chemicals or routine anti-biotics. The term 'organic' is defined by law and all organic food production and processing is governed by a strict set of rules.

Paddock grazing: A field is subdivided into paddocks and each is grazed in turn by a flock or herd and then rested. See also strip grazing and set stocking below.

Pasture: Grassland harvested by the grazing of livestock.

Permanent pasture: A field in which the dominant species are perennial grasses. Permanent pasture is not ploughed and reseeded.

Policy: Global intentions of the farm or business' orientation with respect to the standard and its requirements.

Potable Water: Water that is of sufficiently high quality so that it can be consumed or utilized without risk of immediate or long term harm.

Primary forest: A forest which originally covered a region before changes in the environment brought about by people (*Source: PHC <http://www.eionet.europa.eu>*).

Procedure: Procedure: Specified way to carry out an activity or a process (*Source: ISEAL Alliance*).

Programme: A planned course of action with a detailed and explicit set of directions for accomplishing a purpose.

Record: Record: Document stating results achieved or providing evidence of activities performed (*Source: ISEAL Alliance*).

Renewable energy: Energy sources that do not rely on fuels of which there are only finite stocks. The most widely used renewable source is hydroelectric power; other renewable sources are biomass energy, solar energy, tidal energy, wave energy, and wind energy (*Source: EEA multilingual environmental glossary <http://glossary.eea.europa.eu>*).

Resistance: Fundamental ability of an organism to avert the attack of a potential pathogen up to a certain degree or to resist the effect of a harmful agent.

Rotation: A cropping system in which crops are grown in a field in an annual sequence. A rotation reduces the build up of diseases and pests, aids weed control, improves soil fertility, spreads the risk of crop failure and allows even distribution of labour and machinery requirements.

Silage: Main preservation method of grass for winter feeding to cattle and sheep

Slurry: Thick suspension of a finely divided substance in a liquid producing a paste-like liquid.

Soil Organic Matter (SOM): Soil organic matter has three parts: living organisms, fresh residues, and well-decomposed residues (the living, the dead, and the very dead). Fresh residues are a primary source of food for living organisms. Decomposition of fresh residues releases nutrients needed by plants. Well-decomposed matter, also called “humus,” holds on to some nutrients, storing them for slow release to plants

Strip grazing: This method allocates a fresh area of grass or forage area of the field each day to livestock, by means of an electric fence or other suitable barrier.

Stubble: The part of the crop left above the ground after harvesting cereals such as wheat, barley etc.

Sustainable agriculture: A method of agriculture that is economically viable, socially responsible and ecologically sound. The economic, social and ecological aspects are all interrelated and essential to sustainability - a system capable of maintaining productivity indefinitely.

System: Set of elements that interacts and relates amongst them. A management system is a system to establish policy and objectives and to obtain those objectives.

Tilth: the physical structure of soil as it influences plant growth. A soil with good tilth is porous, allowing water to infiltrate easily, and permitting roots to grow without obstruction.

Threatened or Endangered Species: Species of flora and fauna indicated as threatened or endangered in applicable laws as well as by the International Union for Conservation of Nature and Natural Resources' IUCN Red List of Threatened Species™.

Trap Crop: a crop that is planted to lure pest insects away from an economic crop.

Waste: Waste is an unwanted or undesired material or substance. It is also referred to as rubbish, trash, garbage, or junk depending upon the type of material and the regional terminology. Most waste is comprised of paper, plastic, metals, glass, food waste, organic material, faeces and wood.

Wastewater: Any water that has been adversely affected in quality by anthropogenic influence. It comprises liquid waste discharged by domestic residences, commercial properties, industry, and/or agriculture and can encompass a wide range of potential contaminants and concentrations.

Wildlife Corridors: Corridors that provide routes for animals to travel between where they can forage for food. These 'corridors' are not cultivated every year so farmers can use 'set-aside' or buffer strips for temporary corridors. Hedgerows and beetle banks are examples of permanent corridors.